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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Andrew A. Adamczyk et al.

Serial No.: 10/065,796

Filed: November 20, 2002

For: METHOD AND APPARATUS TO IMPROVE
CATALYZED HYDROCARBON TRAP EFFICIENCY

Attorney Docket No.: FMC 1427 PUS

Group Art Unit: 1724

Examiner: Frank M. Lawrence, Jr.

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal Brief from the final rejection of claims 1-25 of the Office Action dated January 15, 2004. This application was filed on November 20, 2002.

I. REAL PARTY IN INTEREST

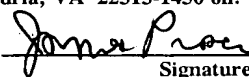
The real party in interest is Ford Global Technologies, Inc., a corporation organized and existing under the laws of the state of Delaware, and having a place of business at Dearborn, Michigan as set forth in the assignment recorded in the U.S. Patent and Trademark Office on November 20, 2002 at Reel 013257/Frame 0212.

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

I hereby certify that this paper, including all enclosures referred to herein, is being deposited with the United States Postal Service as first-class mail, postage pre-paid, in an envelope addressed to: Mail Stop Appeal Brief - Patents, Commissioner for Patents, U.S. Patent & Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 on:

July 19, 2004
Date of Deposit

James W. Proscia
Name of Person Signing


Signature

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to appellant(s), the appellant's(s') legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-25 are pending in this application. Claims 1-25 have been rejected and are the subject of this appeal.

IV. STATUS OF AMENDMENTS

An amendment after final rejection was filed on March 12, 2004, and has been denied entry.

V. SUMMARY OF THE INVENTION

The present invention provides a method for removing hydrocarbons from an exhaust gas of an internal combustion engine. The method of the invention utilizes a tandem configuration in which an automobile exhaust gas is contacted with a water-removing composition and then contacted at a position downstream from the water-removing composition with a specially selected hydrocarbon-removing material to remove hydrocarbons from the exhaust gas. The present invention recognizes the importance of utilizing a hydrocarbon-removing material such as a zeolite with an appropriate Si to Al atom ratio such that desorption of less than 50% of adsorbed hydrocarbons occurs at less than 250° C. Moreover, the Si to Al ratio of the hydrocarbon-removing material that is selected for the method of the invention is such that desorption of the low molecular weight hydrocarbons does not occur until a sufficiently high temperature is attained so that the low molecular weight hydrocarbons in the automobile exhaust can be converted to innocuous species by a catalyst.

VI. ISSUES

1. Is the Examiner's rejection of claims 1-25 under 35 U.S.C. §102(b) as being anticipated by Hertl et al. (U.S. Patent No. 5,417,947) appropriate when Hertl does not disclose nor appreciate the importance of selecting a hydrocarbon-removing material with a Si to Al atom ratio such that desorption of less than 50% of adsorbed hydrocarbons occurs at less than 250° C?

2. Is the Examiner's rejection of claims 1-25 under 35 USC §103(a) as being unpatentable over Hertl in view of Minami et al. (U.S. Patent No. 5,140,811) appropriate when neither Hertl nor Minami disclose nor appreciate the importance of selecting a hydrocarbon-removing material with a Si to Al atom ratio such that desorption of less than 50% of adsorbed hydrocarbons occurs at less than 250° C?

VII. GROUPING OF CLAIMS

Claims 1-25 stand together.

VIII. ARGUMENT

ISSUE 1

Claims 1-25 are rejected under 35 U.S.C. §102(b) as being anticipated by Hertl et al. (U.S. Patent No. 5,417,947).

Applicants respectfully traverse the Examiner's rejection for the following reasons. Hertl does not anticipate the present invention because Hertl does not disclose every element of the invention. (See for example, *Akzo N.V. v. United States Int'l Trade Comm'n*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), cert. denied, 482 U.S. 909 (1987).) Hertl does not teach the utilization of a hydrocarbon-removing material having "a sufficiently low Si to Al

atom ratio that is less than about 50% of the low molecular weight hydrocarbons desorb from the hydrocarbon-removing material at a temperature of about 250°C” as required by independent claims 1 and 14 of the present invention. Hertl et al. does not appreciate or disclose the tailoring of a tandem water-removing composition and hydrocarbon-removing material with properties such that significant desorption of the low molecular weight hydrocarbons does not occur at a temperature at which a catalytic converter in a vehicle exhaust may remove such hydrocarbons. Independent claims 1 and 14 of the present invention express this tailoring with the limitation - “the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that is less than about 50% of the low molecular weight hydrocarbons desorb from the hydrocarbon-removing material at a temperature of about 250° C.”

The Examiner’s statement that Hertl discloses a hydrocarbon removing material with a Si to Al ratio which falls within the range of the present invention does not acknowledge that Hertl fails to disclose the utility of low Si to Al ratios. In essence the Examiner is denying patentability because the ranges of the present invention and of Hertl overlap. However, case law holds that an invention may be patentable even when it discloses a composition with ranges that overlap with the prior art. For example, *Ex parte Shelby* holds:

The only factor which remains to be considered is that of proportions of the several components. Here it must be acknowledged that the percentages of the appealed claims fall within the general proportions of the reference, namely, 25-90 parts, preferably 50-85 parts of methyl methacrylate; 10-60 parts of 2-ethylhexyl acrylate; and 1-10 parts, preferably 2-7 parts of methacrylic acid. However, **this does not completely preclude the granting of a specific patent within the general percentage ranges of the reference.**

Ex parte Shelby, 153 USPQ 476 (1966) (emphasis added)

Similarly, *Becket v. Coe, Commissioner of Patents* also holds an invention may be patentable even though the ranges overlap with the prior art:

In short, within previously claimed ranges Becket has found more restricted ones which produce a different alloy from that known to the prior inventors. One seeking a stainless deep-drawing alloy and finding the Hadfield (French) and Commentry (French) patents could not have said: 'These give me what I want. In the light of the decisions above cited as to the effect of foreign patents as anticipations, neither of the foreign references anticipated Becket.

Becket v. Coe, Commissioner of Patents, 69 App.D.C. 51, 98 F.2d 332 (1937) (emphasis added)

In accordance with *Ex parte Shelby* and *Becket*, the Applicants have discovered a range of Si to Al atom ratios that provide a heretofore unappreciated temperature desorption characteristics that lead to a simplification of an automobile exhaust (see the discussion of Minami below.) The present invention expresses this range for the Si to Al ratio (claims 1 and 14) as “a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular weight hydrocarbons desorb from the hydrocarbon-removing material at a temperature of about 250°C.”. The Si to Al ratio as expressed in independent claims 1 and 14 is necessary to tailor the operation of the tandem water-removing composition and hydrocarbon-removing material of the present application such that significant desorption of the low molecular weight hydrocarbons do not occur until a sufficiently high temperature at which a catalytic converter may remove such hydrocarbons is achieved. Accordingly, in view of the relevant case law as set forth above, independent claims 1 and 14 and their respective dependent claims are allowable even though the present invention may overlap with the prior art.

Accordingly, since Hertl does not anticipate independent claims 1 and 14, dependent claims 2-13 which depend from claim 1, and dependent claims 14-25 which depend from claim 14 are also not anticipated by Hertl.

ISSUE 2

Claims 1-25 are also rejected under 35 USC §103(a) as being unpatentable over Hertl in view of Minami et al. (U.S. Patent No. 5,140,811.)

Applicants respectfully traverse the Examiner's rejection under 35 U.S.C. §103(a) for the following reasons. Neither Hertl nor Minami whether considered individually or in combination disclose a tandem water-removing composition and hydrocarbon-removing material in which hydrocarbon removing material such that significant desorption of low molecular weight hydrocarbons do not occur at a temperature at which a catalytic converter in a vehicle exhaust may remove such hydrocarbons. The deficiencies in Hertl have been set forth above.

Minami discloses an exhaust gas purification device for automotive applications. Minami does not disclose the use of a water-removing composition. The device of Minami includes a hydrocarbon absorber that operates up to a first gas temperature (such as 200° C) (Minami, Abstract). The purification device of Minami then releases the absorbed hydrocarbons in the exhaust gas above a second gas temperature (such as 400° C). The exhaust gases bypass the hydrocarbon absorber when "the temperature detected by said temperature detection means is at or above said first temperature and not higher than a second temperature" (Minami, col. 2, ll. 60-65). Specifically, Minami states that this bypassing of the hydrocarbon absorber should occur and therefore the absorber operated "until the temperature of the exhaust gas rises not to be higher than 300° C, more desirably not to be higher than 250 °C" (Minami, col. 4, ll. 50-53). The present invention does not require such a bypassing of the absorber because the desorption characteristics of the hydrocarbon-removing

material have been specially tailored by utilization of “a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular weight hydrocarbons desorb from the hydrocarbon-removing material at a temperature of about 250° C.” Instead, by recognizing (which Minami does not) that modern catalysts do not require such a high temperature of operation, the present invention allows for a simpler design in which bypass channels are not necessary. Because both Hertl and Minami fail to teach this important limitation, independent claims 1 and 14 of the present invention are patentable over Hertl in view of Minami.

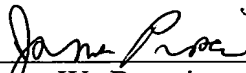
Applicant's state that there is no motivation to combine the teachings of Minami and Hertl. Moreover, the combination of these references does not reproduce the present invention. Hertl discloses a tandem water-removing composition and hydrocarbon removing material with different adsorption properties than the present invention. The only possible combination of Hertl and Minami leads to a tandem water-removing composition and hydrocarbon removing material in which the hydrocarbon removing material **is bypassed above a certain temperature**. This combination is not the present invention. One skilled in the art would not be motivated to make such a combination since such a system is needlessly complicated when considering the temperature characteristics of modern catalytic converters. Moreover, the grafting of certain features of Minami onto Hertl is the purist form of hindsight.

Accordingly, since independent claims 1 and 14 are patentable over Hertl in view of Minami, dependent claims 2-13 which depend from claim 1 and dependent claims 14-25 which depend from claim 14 are also patentable.

The Examiner is authorized to charge the fee of \$330.00 under 35 U.S.C. §1.17(c) in addition to any additional fees or credit any overpayment in connection with this filing to Ford Global Technologies, Inc. Deposit Account No. 06-1510. A duplicate of this notice is enclosed for this purpose.

Respectfully submitted,

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Enclosure - Appendix

IX. APPENDIX - CLAIMS ON APPEAL

1. A method for removing low molecular weight hydrocarbons from an exhaust gas of an internal combustion engine, the method comprising:

- a) contacting the exhaust gas with a water-removing composition; and
- b) contacting the exhaust gas at a position downstream from the water-removing composition with a hydrocarbon-removing material to remove at least some of the hydrocarbons from the exhaust gas;

wherein the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular weight hydrocarbons desorb from the hydrocarbon-removing material at a temperature of about 250°C.

2. The method of claim 1 wherein the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular hydrocarbons desorb from the hydrocarbon-removing composition at a temperature of about 275°C.

3. The method of claim 1 wherein the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular hydrocarbons desorb from the hydrocarbon-removing composition at a temperature of about 300°C.

4. The method of claim 1 wherein the hydrocarbon-removing material is a zeolite.

5. The method of claim 1 wherein the hydrocarbon-removing material is a pentasil zeolite, a faujasite zeolite, mordenite, a beta zeolite, ferrierite, a mesopore zeolite, or mixtures thereof.

6. The method of claim 1 wherein the hydrocarbon-removing material is a zeolites having a Si to Al atom ratio less than about 25.

7. The method of claim 1 wherein the hydrocarbon-removing material is a zeolites having a Si to Al atom ratio less than about 15.

8. The method of claim 1 wherein the hydrocarbon-removing material is a zeolites having a Si to Al atom ratio less than about 10.

9. The method of claim 1 wherein the water-removing composition removes water vapor but not medium-sized hydrocarbons from the exhaust gas.

10. The method of claim 1 wherein the water-removing composition comprises a hydrophilic material.

11. The method of claim 10 wherein the hydrophilic material has a pore size of about 2 to about 5 angstroms in diameter.

12. The method of claim 10 wherein the hydrophilic material has a pore size of about 4 angstroms in diameter.

13. The method of claim 10 wherein the hydrophilic material is selected from the group consisting of molecular sieves, aluminas, silicas, zeolites, and mixtures thereof.

14. A vehicle exhaust system, comprising: a water trap; and a hydrocarbon trap comprising a hydrocarbon-removing material having a sufficiently low Si to Al atom ratio less than about 50% of the low molecular weight hydrocarbons desorb from the

hydrocarbon-removing composition at a temperature of about 250°C wherein the hydrocarbon trap is located downstream of the water trap in the vehicle exhaust system.

15. The vehicle exhaust system of claim 14 wherein the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular hydrocarbons desorb from the hydrocarbon-removing composition at a temperature of about 275°C.

16. The vehicle exhaust system of claim 14 wherein the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than 50% of the low molecular hydrocarbons desorb from the hydrocarbon-removing composition at a temperature of 300°C.

17. The vehicle exhaust system of claim 14 wherein the hydrocarbon-removing material is a zeolite.

18. The vehicle exhaust system of claim 14 wherein the hydrocarbon-removing material is a pentasil zeolite, a faujasite zeolite, mordenite, a beta zeolite, ferriete, a mesopore zeolite, or mixtures thereof.

19. The vehicle exhaust system of claim 14 wherein the hydrocarbon-removing material is a zeolites having a Si to Al atom ratio less than about 25.

20. The vehicle exhaust system of claim 14 wherein the hydrocarbon-removing material is a zeolites having a Si to Al atom ratio less than about 15.

21. The vehicle exhaust system of claim 14 wherein the hydrocarbon-removing material is a zeolites having a Si to Al atom ratio less than about 10.

22. The vehicle exhaust system of claim 14 wherein the water trap removes water vapor but not medium-sized hydrocarbons from the exhaust gas.

23. The vehicle exhaust system of claim 14 wherein the water trap comprises a hydrophilic material.

24. The vehicle exhaust system of claim 23 wherein the hydrophilic material has a pore size of about 2 to about 5 angstroms in diameter.

25. The vehicle exhaust system of claim 23 wherein the hydrophilic material has a pore size of about 4 angstroms in diameter.